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SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: John Maples Examiner # : 62294 Date: 10-30-02
Art Unit: 1745 Phone Number 308-1795 Serial Number: 09/701,950
Mail Box and Bldg/Room Location: CP3-8E12 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

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Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: _____

Inventors (please provide full names): _____

_____

Earliest Priority Filing Date: _____

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

see attached

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PTO-1590 (8-01)

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STRUCTURE FILE UPDATES:   29 OCT 2002  HIGHEST RN 467418-81-1
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Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
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in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

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     (FILE 'HOME' ENTERED AT 14:15:15 ON 30 OCT 2002)

     FILE 'REGISTRY' ENTERED AT 14:16:19 ON 30 OCT 2002
L1          7347 S (LI(L)P(L)O)/ELS
L2          2448 S L1 AND (T1 OR T2 OR T3)/PG
L3           991 S L2 AND O4P

     FILE 'HCA' ENTERED AT 14:21:11 ON 30 OCT 2002
L4           440 S L3
L5        185627 S SINTER?
L6        267146 S ANNEAL? OR TEMPER OR TEMPERS OR TEMPERRED OR TEMPERED O
L7        174149 S BATTERY OR BATTERIES OR (ELECTROCHEM? OR ELECTROLY? OR
L8               QUE ELECTROD## OR CATHOD## OR ANOD##
L9         38429 S NONAQ# OR NONAQUEOUS? OR NONWATER? OR NONH2O OR NON(A)(
L10       390438 S ELECTROLY?
L11           42 S L4 AND L5
L12           23 S L11 AND (L7 OR L8 OR L9 OR L10 OR 52/SC,SX OR 72/SX,SC)
L13           23 S L11 AND (L7 OR L8 OR L10 OR 52/SC,SX OR 72/SC,SX)
L14            8 S L11 AND L9
L15            8 S L13 AND L14
L16            7 S L4 AND L6
L17            2 S L16 AND (L7 OR L8 OR L9 OR L10 OR 52/SC,SX OR 72/SX,SC)
L18           10 S L15 OR L17
L19           14 S L13 NOT L18
L20            5 S L16 NOT (L18 OR L19)
L21            8 S L18 AND L8
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L22          10 S L18 OR L21
L23           4 S L19 AND L8
L24          10 S L19 NOT L23
L25           0 S L20 AND L8
L26          48 S L4 AND (L5 OR L6)
L27          12 S L26 AND L8
L28           0 S L27 NOT (L22 OR L23 OR L24)

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FILE 'HCA' ENTERED AT 14:43:22 ON 30 OCT 2002
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FILE LAST UPDATED: 24 Oct 2002  (20021024/ED)

  This file contains CAS Registry Numbers for easy and accurate
  substance identification.

CAS roles have been modified effective December 16, 2001. Please
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=> d l22 1-10 cbib abs hitstr hitind

L22  ANSWER 1 OF 10  HCA  COPYRIGHT 2002 ACS
136:297395  Method for fabrication of cathode active material
     and a nonaqueous electrolyte battery.
     Hosoya, Mamoru; Fukushima, Yuzuru; Sakai, Hidecki; Kuyama, Junji
     (Sony Corporation, Japan).  Eur. Pat. Appl. EP 1195827 A2 20020410,
     31 pp.  DESIGNATED STATES: R:  AT, BE, CH, DE, DK, ES, FR, GB, GR,
     IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO.  (English).
     CODEN: EPXXDW.  APPLICATION: EP 2001-123894 20011005.  PRIORITY: JP
     2000-308300 20001006; JP 2000-308313 20001006.
AB   The invention comprises a method for producing a cathode
     active material having superior cell characteristics through
     single-phase synthesis of a composite material composed of a compd.
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represented by the general formula LixFe1-yMyPO4 and a carbon material pos. and a method for producing a **non-aq**
. **electrolyte cell** employing the so produced **cathode** active material. To this end, the **cathode** active material is prepd. by a step of mixing the starting materials for synthesis of the compd. represented by the general formula LixFe1-yMyPO4, a step of milling a mixt. obtained by the mixing step, a step of compressing the mixt. obtained by the mixing step to a preset d. and a step of **sintering** the mixt. obtained by the compressing step. A carbon material is added in any one of the above steps prior to the **sintering** step. The d. of the mixt. in the compressing step is set to not less than 1.71 g/cm3 and not larger than 2.45 g/cm3.

IT **198782-39-7**, Iron lithium phosphate (FeLi0-1(PO4))
407606-22-8, Chromium iron lithium phosphate (Cr0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-24-0**, Cobalt iron lithium phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4))
407606-26-2, Copper iron lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-28-4**, Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4))
407606-30-8, Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-32-0**, Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-34-2**
, Iron lithium manganese phosphate (Fe0.2-1Li0.05-1.2Mn0-0.8(PO4))
407606-36-4, Iron lithium nickel phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) **407606-39-7**, Iron lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4))
407606-42-2, Iron lithium molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-0.8(PO4)) **407606-44-4**, Iron lithium titanium phosphate (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4))
407606-47-7, Iron lithium zinc phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) **407606-49-9**, Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4))
407606-51-3, Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0-0.8(PO4))
(method for fabrication of **cathode** active material and **nonaq. electrolyte battery**)

RN 198782-39-7 HCA
CN Iron lithium phosphate (FeLi0-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

RN 407606-22-8 HCA
CN Chromium iron lithium phosphate (Cr0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component

		Registry Number
O4P	1	14265-44-2
Cr	0 - 0.8	7440-47-3
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-24-0 HCA
CN Cobalt iron lithium phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Co	0 - 0.8	7440-48-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-26-2 HCA
CN Copper iron lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Cu	0 - 0.8	7440-50-8
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-28-4 HCA
CN Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6
Al	0 - 0.8	7429-90-5

RN 407606-30-8 HCA
CN Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Ga	0 - 0.8	7440-55-3

Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-32-0 HCA
CN Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
B	0 - 0.8	7440-42-8
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-34-2 HCA
CN Iron lithium manganese phosphate (Fe0.2-1Li0.05-1.2Mn0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mn	0 - 0.8	7439-96-5
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-36-4 HCA
CN Iron lithium nickel phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Ni	0 - 0.8	7440-02-0
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-39-7 HCA
CN Iron lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
V	0 - 0.8	7440-62-2
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-42-2 HCA

CN Iron lithium molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mo	0 - 0.8	7439-98-7
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-44-4 HCA
CN Iron lithium titanium phosphate (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Ti	0 - 0.8	7440-32-6
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-47-7 HCA
CN Iron lithium zinc phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Zn	0 - 0.8	7440-66-6
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-49-9 HCA
CN Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-51-3 HCA
CN Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0-0.8(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component

		Registry Number
O4P	1	14265-44-2
Nb	0 - 0.8	7440-03-1
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **cathode** active material **nonaq electrolyte battery**
IT Ball milling
Battery cathodes
Composites
Secondary **batteries**
(method for fabrication of **cathode** active material and **nonaq. electrolyte battery**)
IT Carbon black, uses
(method for fabrication of **cathode** active material and **nonaq. electrolyte battery**)
IT 7440-44-0, Carbon, uses **198782-39-7**, Iron lithium phosphate (FeLi0-1(PO4)) **407606-22-8**, Chromium iron lithium phosphate (Cr0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-24-0**, Cobalt iron lithium phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-26-2**, Copper iron lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-28-4**, Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-30-8**, Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-32-0**, Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4)) **407606-34-2**, Iron lithium manganese phosphate (Fe0.2-1Li0.05-1.2Mn0-0.8(PO4)) **407606-36-4**, Iron lithium nickel phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) **407606-39-7**, Iron lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4)) **407606-42-2**, Iron lithium molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-0.8(PO4)) **407606-44-4**, Iron lithium titanium phosphate (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4)) **407606-47-7**, Iron lithium zinc phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) **407606-49-9**, Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4)) **407606-51-3**, Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0-0.8(PO4)) 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-10-8 407630-14-2
(method for fabrication of **cathode** active material and **nonaq. electrolyte battery**)
IT 15365-14-7P, Iron lithium phosphate FeLiPO4
(method for fabrication of **cathode** active material and **nonaq. electrolyte battery**)
IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer

(method for fabrication of **cathode** active material and **nonaq. electrolyte battery**)

L22 ANSWER 2 OF 10 HCA COPYRIGHT 2002 ACS
136:281939 **Nonaqueous electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium. Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1193787 A2 20020403, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123181 20010927. PRIORITY: JP 2000-301399 20000929.

AB An LiFePO4 carbon composite material is to be synthesized in a single phase to realize superior cell characteristics. To this end, in the prepn. of a **cathode** active material, starting materials for synthesis of a compd. having the formula LixFePO4, where 0 < x .ltoreq. 1, are mixed together, milled and **sintered**. A carbon material is added at one of these steps. As the starting materials for synthesis for LixFePO4, Li3PO4, Fe3PO4, Fe3(PO4)2 or its hydrate Fe3(PO4)2.cntdot.nH2O, where n is the no. of hydrates, are used, and the content of Fe3+ in the total iron in Fe3(PO4)2 or its hydrate Fe3(PO4)2.cntdot.nH2O is set to 61 wt% or less.

IT **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(**nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)
RN 198782-39-7 HCA
CN Iron lithium phosphate (FeLi0-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery cathode** lithium iron phosphate carbon composite
IT Secondary **batteries**
(lithium; **nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)
IT Ball milling
Battery cathodes
Composites
Sintering
(**nonaq. electrolyte battery**

cathode active material capable of reversibly doping/undoping lithium)

IT Carbonaceous materials (technological products)
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

IT Fluoropolymers, uses
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate 10045-86-0, Ferric phosphate 10377-52-3, Lithium phosphate li3po4 31096-55-6
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 15365-14-7, Iron lithium phosphate FeLiPO4 21324-40-3, Lithium hexafluorophosphate
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

IT 24937-79-9, Pvdf
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

IT **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

IT 872-36-6, Vinylene carbonate
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

L22 ANSWER 3 OF 10 HCA COPYRIGHT 2002 ACS

136:281938 **Nonaqueous electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium. Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1193786 A2 20020403, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123180 20010927. PRIORITY: JP 2000-301401 20000929.

AB A LiFePO4 carbon composite material is to be synthesized in a single phase satisfactorily to achieve superior cell characteristics. In prepg. a **cathode** active material, starting materials for synthesis of a compd. represented by the general formula LixFePO4, where 0 < x .ltoreq. 1, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course

of mixing, milling and **sintering**. Li3PO4, Fe3(PO4)2 or its hydrates Fe3(PO4)2.cntdot.nH2O, where n denotes the no. of hydrates, are used as the starting materials for synthesis of LixFePO4. The temp. of a product from the **sintering** is set to 305.degree. or less when the product from the **sintering** is exposed to atm. The oxygen concn. in a **sintering** atm. is set to 1012 ppm in vol. or less at the time point of **sintering**.

IT **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(**nonaq. electrolyte battery cathode** active material capable of reversibly doping/undoping lithium)

RN 198782-39-7 HCA

CN Iron lithium phosphate (FeLi0-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery cathode** lithium iron phosphate carbon composite

IT Secondary **batteries**
(lithium; **nonaq. electrolyte battery cathode** active material capable of reversibly doping/undoping lithium)

IT **Battery cathodes**
Composites
Sintering
(**nonaq. electrolyte battery cathode** active material capable of reversibly doping/undoping lithium)

IT Carbon black, uses
Carbonaceous materials (technological products)
(**nonaq. electrolyte battery cathode** active material capable of reversibly doping/undoping lithium)

IT Fluoropolymers, uses
(**nonaq. electrolyte battery cathode** active material capable of reversibly doping/undoping lithium)

IT Ball milling
(planetary; **nonaq. electrolyte battery cathode** active material capable of reversibly doping/undoping lithium)

IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate

10377-52-3, Lithium phosphate 14940-41-1, Iron phosphate fe3(po4)2 31096-55-6
(**nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 21324-40-3, Lithium hexafluorophosphate
(**nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)

IT 872-36-6, Vinylene carbonate 7440-44-0, Carbon, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Poly(vinylidene fluoride)
(**nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)

IT 15365-14-7P, Iron lithium phosphate felipo4 **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(**nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)

IT 7782-44-7, Oxygen, uses
(**nonaq. electrolyte battery** **cathode** active material capable of reversibly doping/undoping lithium)

L22 ANSWER 4 OF 10 HCA COPYRIGHT 2002 ACS
136:281937 **Nonaqueous electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium. Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1193785 A2 20020403, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-122769 20010921. PRIORITY: JP 2000-301402 20000929.

AB A LiFePO4 carbon composite material is to be synthesized in a single phase satisfactorily to prevent the deterioration of the performance of the **cathode** active material from occurring and achieve superior cell characteristics. In prepg. a **cathode** active material, starting materials for synthesis of a compd. represented by the general formula LixFePO4, where 0 < x .ltoreq. 1, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and **sintering**. Li3PO4, Fe3(PO4)2 or its hydrates Fe3(PO4)2.cntdot.nH2O, where n denotes the no. of hydrates, are used as the starting materials for synthesis of LixFePO4. The temp. of a product from the **sintering** is set to 305.degree. or less when the product from the **sintering** is exposed to atm.

IT **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly

doping/undoping lithium)
RN 198782-39-7 HCA
CN Iron lithium phosphate (FeLi0-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery cathode** lithium iron phosphate carbon composite
IT Secondary **batteries**
(lithium; **nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT **Battery cathodes**
Composites
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT Carbonaceous materials (technological products)
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT Fluoropolymers, uses
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT Ball milling
(planetary; **nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT 10377-52-3, Lithium phosphate li3po4 14940-41-1, Iron phosphate fe3(po4)2 31096-55-6
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 872-36-6, Vinylene carbonate 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
IT 7440-44-0, Carbon, uses 24937-79-9, Pvdf

(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)

IT 15365-14-7P, Iron lithium phosphate FeLiPO4 **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)

L22 ANSWER 5 OF 10 HCA COPYRIGHT 2002 ACS
136:265826 Method for the preparation of **cathode** active material for a **nonaqueous electrolyte battery**. Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1193784 A2 20020403, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-122752 20010921. PRIORITY: JP 2000-301403 20000929.

AB A LiFePO4 carbon composite material is to be synthesized in a single phase satisfactorily to achieve superior cell characteristics. In prepg. a **cathode** active material, a starting material for synthesis of a compd. represented by the general formula LixFePO4, where 0<.times..ltoreq.1, is mixed, milled and **sintered** and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and **sintering**. Li3PO4, Fe3(PO4)2 or its hydrates Fe3(PO4)2.cntdot.nH2O, where n denotes the no. of hydrates, are used as the starting material for synthesis of LixFePO4. The particle size distribution of particles of the starting material for synthesis following the milling with the particle size not less than 3 .mu.m is set to 2.2% or less in terms of the volumetric integration frequency.

IT **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

RN 198782-39-7 HCA
CN Iron lithium phosphate (FeLi0-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery cathode** lithium iron phosphate carbon composite
IT Secondary **batteries**
(lithium; method for prepn. of **cathode** active material

for **nonaq. electrolyte battery**)

IT **Battery cathodes**
Particle size distribution
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

IT Carbon black, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

IT Ball milling
(planetary; method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

IT 7440-44-0, Carbon, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

IT 15365-14-7P, Iron lithium phosphate FeLiPO4 **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

L22 ANSWER 6 OF 10 HCA COPYRIGHT 2002 ACS
136:203096 Method for preparation of **cathode** active material for **nonaqueous electrolyte battery**.
Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1184920 A2 20020306, 21 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-120637 20010830. PRIORITY: JP 2000-261277 20000830.

AB A **cathode** active material improved in electron cond. and a **non-aq. electrolyte cell** employing this **cathode** active material and which is improved in cell capacity and cyclic characteristics are disclosed. The **cathode** active material is composed of a compd. having the general formula LixFePO4 where 0 < x .ltoreq. 1.0, and a carbon material, with the carbon content per unit wt. being not less than 3 wt% and with the powder d. being not lower than 2.2 g/cm3.

IT **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

RN 198782-39-7 HCA
CN Iron lithium phosphate (FeLi0-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2

Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
ICS H01M004-62; H01M004-04
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **cathode** active material prepn **nonaq electrolyte battery**
IT Secondary **batteries**
(lithium; method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT **Battery cathodes**
Sintering
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT Carbonaceous materials (technological products)
Fluoropolymers, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT Carbon black, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT 10045-86-0, Phosphoric acid, iron(3+) salt (1:1) 10377-52-3, Lithium phosphate
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 21324-40-3, Lithium hexafluorophosphate
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT 24937-79-9, Pvdf
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT 15365-14-7P, Iron lithium phosphate FeLiPO4 **198782-39-7P**, Iron lithium phosphate (FeLi0-1(PO4))
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
IT 7440-44-0, Carbon, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)

L22 ANSWER 7 OF 10 HCA COPYRIGHT 2002 ACS
135:347775 Li3Sc2-xFex(PO4)3 thin films and powders prepared by ultrasonic spray pyrolysis. Ivanov-Schitz, A. K.; Nistuk, A. V.; Demianets, L. N.; Chaban, N. G. (Institute of Crystallography, Russian Academy of Science, Moscow, Russia). Solid State Ionics, 144(1,2), 133-141 (English) 2001. CODEN: SSIOD3. ISSN: 0167-2738. Publisher: Elsevier Science B.V..
AB Thin films of Li3Sc2-xFex(PO4)3 (x=0.5, 2) solid **electrolytes** have been prepd. on quartz glass substrates by

ultrasonic spray pyrolysis (USP) using aq. solns. of LiH2PO4, Sc(NO3)3 and Fe(NO3)3 at substrate temp. of 500-700.degree.C. The amorphous as-deposited films were converted into cryst. materials by heat treatment at 800-1000.degree.C. The optimal deposition parameters for formation of uniform precursor films with good adhesion to the substrate were detd. The dense films composed of fine columnar grains were obtained using the 3 cycles of deposition and **annealing**. The room temp. ionic cond. of the film with the compn. x=0.5 was 5.times.10-6 S/cm. The superionic .gamma.-phase of USP ceramics of compn. Li3Sc2-xFex(PO4)3 (0<x.ltoreq.0.6) was stabilized at room temp., which may be caused by slight structural distortions and changes in the interactions between the lithium ions during Sc3+.fwdarw.Fe3+ substitution. The highest ionic cond. .sigma.(25.degree.C) .apprxeq. 1.times.10-5 S/cm was obsd. for ceramics with x=0.4.

IT **141051-47-0P**, Iron lithium scandium phosphate Fe0.2Li3Sc1.8(PO4)3 **155694-16-9P**, Iron lithium scandium phosphate Fe0.4Li3Sc1.6(PO4)3 **155694-17-0P**, Iron lithium scandium phosphate Fe0.6Li3Sc1.4(PO4)3 **371758-79-1P**, Iron lithium scandium phosphate (Fe0.1Li3Sc1.9(PO4)3) **371758-80-4P**, Iron lithium scandium phosphate (Fe0.3Li3Sc1.7(PO4)3)
(powders and films; ultrasonic spray pyrolysis prepn. and properties of Li3Sc2-xFex(PO4)3 thin films and powders)

RN 141051-47-0 HCA
CN Iron lithium scandium phosphate (Fe0.2Li3Sc1.8(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Sc	1.8	7440-20-2
Li	3	7439-93-2
Fe	0.2	7439-89-6

RN 155694-16-9 HCA
CN Iron lithium scandium phosphate (Fe0.4Li3Sc1.6(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Sc	1.6	7440-20-2
Li	3	7439-93-2
Fe	0.4	7439-89-6

RN 155694-17-0 HCA
CN Iron lithium scandium phosphate (Fe0.6Li3Sc1.4(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Sc	1.4	7440-20-2
Li	3	7439-93-2
Fe	0.6	7439-89-6

RN 371758-79-1 HCA
CN Iron lithium scandium phosphate (Fe0.1Li3Sc1.9(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Sc	1.9	7440-20-2
Li	3	7439-93-2
Fe	0.1	7439-89-6

RN 371758-80-4 HCA
CN Iron lithium scandium phosphate (Fe0.3Li3Sc1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Sc	1.7	7440-20-2
Li	3	7439-93-2
Fe	0.3	7439-89-6

CC 57-2 (Ceramics)
Section cross-reference(s): **52**, 76
IT Solid **electrolytes**
(iron lithium scandium phosphate powders and films; ultrasonic spray pyrolysis prepn. and properties of Li3Sc2-xFex(PO4)3 thin films and powders)
IT 36058-25-0P, Iron lithium phosphate Fe2Li3(PO4)3 87796-15-4P, Lithium scandium phosphate Li3Sc2(PO4)3 **141051-47-0P**, Iron lithium scandium phosphate Fe0.2Li3Sc1.8(PO4)3 **155694-16-9P**, Iron lithium scandium phosphate Fe0.4Li3Sc1.6(PO4)3 **155694-17-0P**, Iron lithium scandium phosphate Fe0.6Li3Sc1.4(PO4)3 **371758-79-1P**, Iron lithium scandium phosphate (Fe0.1Li3Sc1.9(PO4)3) **371758-80-4P**, Iron lithium scandium phosphate (Fe0.3Li3Sc1.7(PO4)3) 371758-81-5P
(powders and films; ultrasonic spray pyrolysis prepn. and properties of Li3Sc2-xFex(PO4)3 thin films and powders)

L22 ANSWER 8 OF 10 HCA COPYRIGHT 2002 ACS
135:346864 **Cathode** for **nonaqueous electrolyte** lithium ion **battery**. Yamada, Atsuo;

Yamahira, Takayuki (Sony Corporation, Japan). Eur. Pat. Appl. EP 1150368 A2 20011031, 26 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-109919 20010424. PRIORITY: JP 2000-128998 20000425.

AB The lithium ion cell is improved appreciably in operational stability under special conditions, such as high temps., and exhibits superior characteristics against over-discharging, while guaranteeing compatibility to the operating voltage of a conventional lithium ion cell and an energy d. equiv. to that of the conventional lithium ion cell. To this end, the lithium ion cell includes a pos. **electrode**, a neg. **electrode** and a **nonaq. electrolyte**, and uses, as a pos. **electrode** active material, a composite material of a first lithium compd. represented by the general formula LixMyPO4, where 0 <x< 2, 0.8 <y< 1.2 and M contains Fe, and a second lithium compd. having a potential holder than the potential of the first lithium compd.

IT **19414-36-9**, Iron lithium manganese phosphate ((Fe,Mn)Li(PO4))
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

RN 19414-36-9 HCA

CN Iron lithium manganese phosphate ((Fe,Mn)Li(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mn	0 - 1	7439-96-5
Li	1	7439-93-2
Fe	0 - 1	7439-89-6

IC ICM H01M004-58
ICS C01G049-00; C01B025-30; C01B025-45; H01M004-38

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **nonaq electrolyte cathode**

IT Charcoal
(activated; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT **Battery cathodes**
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Carbon fibers, uses
Carbonaceous materials (technological products)
Coke
Petroleum coke
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Carbon black, uses

(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Fluoropolymers, uses
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Organic compounds, uses
(high mol., **sintered**; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Secondary **batteries**
(lithium; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Coke
(needle; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Coke
(pitch; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Furan resins
Phenolic resins, uses
(**sintered** and carbonized; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT 50-21-5D, Lactic acid, ester 60-29-7, Diethyl ether, uses 64-19-7D, Acetic acid, ester, uses 75-05-8, Acetonitrile, uses 79-09-4D, Propionic acid, ester 96-47-9, 2-Methyltetrahydrofuran 96-48-0 96-49-1, Ethylene carbonate 100-66-3, Anisole, uses 105-58-8, Diethyl carbonate 107-12-0, Propionitrile 108-32-7, Propylene carbonate 109-99-9, Thf, uses 110-71-4, 1,2-Dimethoxyethane 126-33-0, Sulfolane 409-21-2, Silicon carbide sic, uses 554-12-1, Methyl propionate 616-38-6, Dimethyl carbonate 623-42-7, Methyl butyrate 623-96-1, Dipropyl carbonate 629-14-1, 1,2-Diethoxyethane 646-06-0, 1,3-Dioxolane 872-36-6, Vinylene carbonate 1072-47-5, 4-Methyl-1,3-dioxolane 1313-08-2 2550-62-1, Lithium methanesulfonate 4437-85-8, Butylene carbonate 7439-93-2, Lithium, uses 7440-50-8, Copper, uses 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium bromide 7782-42-5, Graphite, uses 7791-03-9, Lithium perchlorate 9003-07-0, Polypropylene 12007-81-7, Silicon tetraboride 12008-29-6, Silicon hexaboride 12013-56-8, Calcium disilicide 12017-12-8, Cobalt disilicide 12018-09-6, Chromium disilicide 12022-99-0, Iron disilicide 12032-86-9, Manganese disilicide 12033-76-0, Silicon nitride oxide Si2N2O 12033-89-5, Silicon nitride, uses 12034-80-9, Niobium disilicide 12039-79-1, Tantalum disilicide 12039-83-7, Titanium silicide TiSi2 12039-87-1, Vanadium disilicide 12039-88-2, Tungsten disilicide 12059-14-2, Nickel silicide (Ni2Si) 12136-78-6, Molybdenum disilicide 12159-07-8, Copper silicide cu5si 12190-79-3, Cobalt lithium oxide colio2 12201-89-7, Nickel disilicide 14283-07-9, Lithium tetrafluoroborate 14485-20-2, Lithium tetraphenylborate 15365-14-7, Iron lithium phosphate FeLiPO4 **19414-36-9**, Iron lithium manganese phosphate ((Fe,Mn)Li(PO4)) 21324-40-3,

Lithium hexafluorophosphate 22831-39-6, Magnesium silicide (Mg2Si) 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium trifluoromethanesulfonate 35678-71-8, Methylsulfolane 90076-65-6 113066-89-0, Cobalt lithium nickel oxide Co0.2LiNi0.8O2 113671-38-8, Silicon oxide SiO0-2 160479-36-7, Lithium tin oxide 178958-56-0, Lithium silicon oxide 300858-61-1 339333-78-7, Zinc silicide ZnSi2 371148-86-6, Tin oxide (SnO0-2) 371148-87-7, Lithium magnesium manganese oxide (LiMg0.2Mn0.8O2)
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT 24937-79-9, Pvdf
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT 7440-44-0, Carbon, uses
(pyrocarbon; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

L22 ANSWER 9 OF 10 HCA COPYRIGHT 2002 ACS

135:79439 Manufacture of spinel type lithium manganate and **cathode** active mass for secondary **nonaqueous electrolyte batteries**. Numata, Koichi; Kamata, Tsuneyoshi (Mitsui Mining and Smelting Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001180939 A2 20010703, 30 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-367557 19991224.

AB Spinel type Li manganate is prepd. by mixing **electrolytic** MnO2 and/or MnCO3 contg. .gtoreq.150 ppm Mg with a Li source and an amt. of source compd. of Mg, Al, Fe, Cu, Zn, Ca, Si, P, Ti, Cr, Na, K, V, and/or B sufficient to replace 0.05-12.5 mol.% of Mn and **sintering** the mixt. The Li manganate is used as **cathode** active mass in secondary Li **batteries**.

IT **347384-56-9P**, Lithium manganese oxide phosphate (LiMn1.9O3.6(PO4)0.1) **347384-57-0P**, Lithium manganese oxide phosphate (LiMn1.8O3.2(PO4)0.2)
(compns. and manuf. of magnesium contg. substituted spinel type lithium manganate for secondary lithium **battery cathodes**)

RN 347384-56-9 HCA

CN Lithium manganese oxide phosphate (LiMn1.9O3.6(PO4)0.1) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	3.6	17778-80-2
O4P	0.1	14265-44-2
Mn	1.9	7439-96-5
Li	1	7439-93-2

RN 347384-57-0 HCA

CN Lithium manganese oxide phosphate (LiMn1.8O3.2(PO4)0.2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	3.2	17778-80-2
O4P	0.2	14265-44-2
Mn	1.8	7439-96-5
Li	1	7439-93-2

IC ICM C01G045-12
ICS H01M004-02; H01M004-58; H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST secondary **battery cathode** substituted lithium manganate manuf
IT **Battery cathodes**
(compns. and manuf. of magnesium contg. substituted spinel type lithium manganate for secondary lithium **battery cathodes**)
IT 12057-17-9P, Lithium manganese oxide (LiMn2O4) 130260-87-6P, Chromium lithium manganese oxide (Cr0.1LiMn1.9O4) 130732-38-6P, Iron lithium manganese oxide (Fe0.2LiMn1.8O4) 130811-80-2P, Lithium manganese nickel oxide (LiMn1.8Ni0.2O4) 136479-29-3P, Calcium lithium manganese oxide (Ca0.1LiMn1.9O4) 136479-30-6P, Lithium manganese zinc oxide (LiMn1.9Zn0.1O4) 136479-37-3P, Lithium magnesium manganese oxide (LiMg0.2Mn1.8O4) 136479-43-1P, Lithium magnesium manganese oxide (LiMg0.1Mn1.9O4) 143599-23-9P, Lithium manganese zinc oxide (LiMn1.8Zn0.2O4) 145423-77-4P, Lithium manganese borate oxide (LiMn1.9(BO3)0.1O3.7) 145896-59-9P, Aluminum lithium manganese oxide (Al0.1LiMn1.9O4) 146956-26-5P, Cobalt lithium manganese oxide (Co0.1LiMn1.9O4) 147787-62-0P, Lithium manganese nickel oxide (LiMn1.9Ni0.1O4) 147812-19-9P, Iron lithium manganese oxide (Fe0.1LiMn1.9O4) 152013-71-3P, Lithium manganese titanium oxide (LiMn1.8Ti0.2O4) 171827-58-0P, Aluminum lithium manganese oxide (Al0.25LiMn1.75O4) 171827-60-4P, Cobalt lithium manganese oxide (Co0.25LiMn1.75O4) 177988-73-7P, Lithium manganese titanium oxide (LiMn1.9Ti0.1O4) 182866-80-4P, Lithium manganese vanadium oxide (LiMn1.9V0.1O4) 188592-69-0P, Cobalt lithium manganese oxide (Co0.01LiMn1.99O4) 191025-26-0P, Lithium manganese oxide silicate (LiMn1.8O3.2(SiO4)0.2) 191025-29-3P, Calcium lithium manganese oxide (Ca0.2LiMn1.8O4) 191025-31-7P, Copper lithium manganese oxide (Cu0.2LiMn1.8O4) 192754-58-8P, Lithium manganese nickel oxide (LiMn1.99Ni0.01O4) 192754-63-5P, Chromium lithium manganese oxide (Cr0.01LiMn1.99O4) 198195-81-2P, Lithium manganese borate oxide (LiMn1.98(BO3)0.02O3.94) 198830-10-3P, Chromium lithium manganese oxide (Cr0.25LiMn1.75O4) 201857-54-7P, Copper lithium manganese oxide (Cu0.1LiMn1.9O4) 209470-15-5P, Aluminum lithium manganese oxide (Al0.01LiMn1.99O4) 209470-17-7P, Iron lithium manganese oxide (Fe0.01LiMn1.99O4) 220480-69-3P, Lithium manganese oxide silicate (LiMn1.9O3.6(SiO4)0.1) 347384-54-7P, Lithium magnesium manganese oxide (LiMg0.01Mn1.99O4) **347384-56-9P**, Lithium manganese oxide phosphate (LiMn1.9O3.6(PO4)0.1) **347384-57-0P**,

Lithium manganese oxide phosphate (LiMn1.8O3.2(PO4)0.2)
347384-58-1P, Lithium manganese sodium oxide (LiMn1.98Na0.02O4)
347384-59-2P, Lithium manganese sodium oxide (LiMn1.9Na0.1O4)
347384-60-5P, Lithium manganese potassium oxide (LiMn1.98K0.02O4)
347384-61-6P, Lithium manganese potassium oxide (LiMn1.9K0.1O4)
347384-62-7P, Lithium manganese vanadium oxide (LiMn1.99V0.01O4)
347384-63-8P, Lithium manganese vanadium oxide (LiMn1.75V0.25O4)
(compns. and manuf. of magnesium contg. substituted spinel type lithium manganate for secondary lithium **battery cathodes**)

IT 7439-95-4, Magnesium, uses
(magnesium contg. manganese sources in manuf. of lithium manganate for secondary lithium **battery cathodes**)

IT 598-62-9, Manganese carbonate 1313-13-9, Manganese dioxide, processes
(magnesium contg. manganese sources in manuf. of lithium manganate for secondary lithium **battery cathodes**)

L22 ANSWER 10 OF 10 HCA COPYRIGHT 2002 ACS

114:176333 Solid **electrolyte** and its preparation. Yamamura, Koji; Takada, Kazunori; Taniguchi, Noboru; Kondo, Shigeo (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 02225310 A2 19900907 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1989-43759 19890223.

AB A Li ion conductive solid **electrolyte** is Li1+xMxTi2-x(PO4)3 (M = B, Al, Ga, In, Tl, Sc, Y, La, Ce, Pr) and optionally a metal oxide is added to the phosphate and its prepn. involves making the phosphate amorphous and **annealing** the resulting phosphate. The solid **electrolyte** is prepd. by adding H3PO4 to ethanol contg. salts of Li, Ti, and M, neutralizing the soln. by alkali to give a mainly Li3PO4 and Ti3(PO4)4 mixt., and sintering the mixt. The **electrolyte** is useful for solid **electrolyte batteries**, elec. double layer capacitors, electrochromic display, etc. The ion cond. of the phosphate compd. depends on its grain size and grain size uniformity.

IT **120479-61-0**, Aluminum lithium titanium phosphate [Al0.3Li1.3Ti1.7(PO4)3] **127689-78-5**, Lanthanum lithium titanium phosphate [La0.3Li1.3Ti1.7(PO4)3] **127887-18-7**, Lithium scandium titanium phosphate [Li1.3Sc0.3Ti1.7(PO4)3] **131313-56-9**, Lithium titanium yttrium phosphate (Li1.3Ti1.7Y0.3(PO4)3) **131313-74-1**, Gallium lithium titanium phosphate (Ga0.3Li1.3Ti1.7(PO4)3) **131313-76-3**, Indium lithium titanium phosphate (In0.3Li1.3Ti1.7(PO4)3) **133138-74-6**, Cerium lithium titanium phosphate (Ce0.3Li1.3Ti1.7(PO4)3) **133174-38-6**, Lithium thallium titanium phosphate (Li1.3Tl0.3Ti1.7(PO4)3) **133174-39-7**, Lithium praseodymium titanium phosphate (Li1.3Pr0.3Ti1.7(PO4)3)
(solid **electrolyte** of, lithium ion conductive, for **battery** and capacitor and display device)

RN 120479-61-0 HCA
CN Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

RN 127689-78-5 HCA
CN Lanthanum lithium titanium phosphate (La0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
La	0.3	7439-91-0

RN 127887-18-7 HCA
CN Lithium scandium titanium phosphate (Li1.3Sc0.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

RN 131313-56-9 HCA
CN Lithium titanium yttrium phosphate (Li1.3Ti1.7Y0.3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Y	0.3	7440-65-5
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 131313-74-1 HCA
CN Gallium lithium titanium phosphate (Ga0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ga	0.3	7440-55-3
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 131313-76-3 HCA
CN Indium lithium titanium phosphate (In0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
In	0.3	7440-74-6
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 133138-74-6 HCA
CN Cerium lithium titanium phosphate (Ce0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ce	0.3	7440-45-1
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 133174-38-6 HCA
CN Lithium thallium titanium phosphate (Li1.3Tl0.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Tl	0.3	7440-28-0
Li	1.3	7439-93-2

RN 133174-39-7 HCA
CN Lithium praseodymium titanium phosphate (Li1.3Pr0.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2

Ti	1.7	7440-32-6
Pr	0.3	7440-10-0
Li	1.3	7439-93-2

IC ICM C01B025-45
ICS C01B035-14; H01B001-06; H01M006-18; H01M010-36
CC 76-2 (Electric Phenomena)
Section cross-reference(s): **52**, 74
ST lithium titanium phosphate ion conductive; **battery** capacitor display solid **electrolyte**
IT **Batteries**, primary
(lithium ion conductive solid **electrolyte** for, phosphate compds. as)
IT Electric capacitors
(double-layer, lithium ion conductive solid **electrolyte** for, phosphate compds. as)
IT Optical imaging devices
(electrochromic, lithium ion conductive solid **electrolyte** for, phosphate compds. as)
IT **120479-61-0**, Aluminum lithium titanium phosphate [Al0.3Li1.3Ti1.7(PO4)3] **127689-78-5**, Lanthanum lithium titanium phosphate [La0.3Li1.3Ti1.7(PO4)3] **127887-18-7**, Lithium scandium titanium phosphate [Li1.3Sc0.3Ti1.7(PO4)3] **131313-56-9**, Lithium titanium yttrium phosphate (Li1.3Ti1.7Y0.3(PO4)3) **131313-74-1**, Gallium lithium titanium phosphate (Ga0.3Li1.3Ti1.7(PO4)3) **131313-76-3**, Indium lithium titanium phosphate (In0.3Li1.3Ti1.7(PO4)3) **133138-74-6**, Cerium lithium titanium phosphate (Ce0.3Li1.3Ti1.7(PO4)3) 133139-17-0 **133174-38-6**, Lithium thallium titanium phosphate (Li1.3Tl0.3Ti1.7(PO4)3) **133174-39-7**, Lithium praseodymium titanium phosphate (Li1.3Pr0.3Ti1.7(PO4)3)
(solid **electrolyte** of, lithium ion conductive, for **battery** and capacitor and display device)

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L23 ANSWER 1 OF 4 HCA COPYRIGHT 2002 ACS
135:35187 **Batteries** comprising solid **electrolytes** sandwiched in between spinel-type lithium manganate **cathodes** and spinel-type lithium titanate **anodes**. Hara, Toru; Kitahara, Nobuyuki; Uemura, Toshihiko; Mishima, Hiromitsu; Magome, Shinji; Osaki, Makoto; Higuchi, Hisashi (Kyocera Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001155763 A2 20010608, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-336715 19991126.
AB The **batteries** comprise solid **electrolytes** of (A) **sintered** materials of Li2MnO3 and Li1+x+yMxTi2-xSiyP3-yO12 (I; M = Al or Ga; x = 0-0.4; 0 < y .ltoreq. 0.6) on the **cathode** side and (B) **sintered** materials of Li2TiO3 and I on the **anode** side, sandwiched in between the **electrodes** and placed in an outer package. Such

batteries with **cathodes** consisting of Li1+xMn2-xO4 (x = 0.05-0.2) or Li1+xNiyMn2-x-yO4 (x = 0-0.2; 0.4 .ltoreq. y < 0.6) and **anodes** consisting of Li1+xTi2-xO4 (x = 0.25-0.40) are also claimed. **Batteries** with low surface resistance between the **electrodes** and the **electrolytes** are obtained. The **batteries** are suitable for use in personal digital assistance.

IT **343950-37-8 343950-39-0 343950-42-5**
(**electrolyte**; **batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)

RN 343950-37-8 HCA
CN Aluminum lithium manganese titanium oxide phosphate silicate (Al0.22Li1.5Mn0.27Ti1.24O0.54(PO4)2.19(SiO4)0.07) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0.54	17778-80-2
O4Si	0.07	17181-37-2
O4P	2.19	14265-44-2
Ti	1.24	7440-32-6
Mn	0.27	7439-96-5
Li	1.5	7439-93-2
Al	0.22	7429-90-5

RN 343950-39-0 HCA
CN Aluminum lithium titanium phosphate silicate (Al0-0.4Li1-2Ti1.4-2(PO4)2.4-3(SiO4)0-0.6) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0 - 0.6	17181-37-2
O4P	2.4 - 3	14265-44-2
Ti	1.4 - 2	7440-32-6
Li	1 - 2	7439-93-2
Al	0 - 0.4	7429-90-5

RN 343950-42-5 HCA
CN Gallium lithium titanium phosphate silicate (Ga0-0.4Li1-2Ti1.4-2(PO4)2.4-3(SiO4)0-0.6) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0 - 0.6	17181-37-2
O4P	2.4 - 3	14265-44-2
Ga	0 - 0.4	7440-55-3
Ti	1.4 - 2	7440-32-6

Li | 1 - 2 | 7439-93-2

IC ICM H01M010-36
ICS H01M004-02; H01M004-58
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57
ST lithium titanium phosphate silicate **battery electrolyte**; spinel lithium oxide **electrode battery electrolyte**; personal digital assistance solid **electrolyte battery**
IT **Battery anodes**
Battery cathodes
Battery electrolytes
Solid state secondary **batteries**
(**batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
IT 123921-35-7, Lithium titanium oxide (Li1.33Ti1.6704) 343950-34-5, Lithium titanium oxide (Li1.25-1.4Ti1.6-1.7504)
(**anode**; **batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
IT 343950-44-7
(**cathode**-side **electrolyte**; **batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
IT 155472-68-7, Lithium manganese oxide (Li1.1Mn1.904) 335638-14-7, Lithium manganese oxide (Li1.05-1.2Mn1.8-1.9504) 343950-32-3, Lithium manganese nickel oxide (Li1-1.2Mn0.4-0.6Ni0.2-0.604)
(**cathode**; **batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
IT 12031-82-2, Lithium titanium oxide (Li2TiO3)
(**electrolyte** on **anode** side contg.; **batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
IT 12163-00-7, Lithium manganese oxide (Li2MnO3)
(**electrolyte** on **cathode** side contg.; **batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
IT **343950-37-8 343950-39-0 343950-42-5**
(**electrolyte**; **batteries** comprising lithium

titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)

L23 ANSWER 2 OF 4 HCA COPYRIGHT 2002 ACS

132:67892 Comparative study of lithium ion conductors in the system Li1+xAlxA2-xIV (PO4)3 with AIV = Ti or Ge and 0.1toreq.x.1toreq.0.7 for use as Li+ sensitive membranes. Cretin, M.; Fabry, P. (Laboratoire d'Electrochimie et de Physico-chimie des Materiaux et des Interfaces, ENSEEG, Associe CNRS(UMR 5631) et Universite J. Fourier (Grenoble 1), Saint Martin d'Heres, 38402, Fr.). Journal of the European Ceramic Society, 19(16), 2931-2940 (English) 1999. CODEN: JECSER. ISSN: 0955-2219. Publisher: Elsevier Science Ltd..

AB Prepns. and physico-chem. characterizations of NASICON-type compds. in the system Li1+x AlxA2-xIV(PO4)3 (AIV = Ti or Ge) are described. Ceramics have been fabricated by sol-gel and cogrinding processes for use as ionosensitive membrane for Li+ selective **electrodes**. The structural and elec. characteristics of the pellets have been examd. Solid solns. are obtained with Al/Ti and Al/Ge substitutions in the range 0.1toreq.x.1toreq.0.6. A min. of the rhombohedral c parameter appears for x about 0.1 for both solns. The grain ionic cond. has been characterized only in the case of Ge-based compds. It is related to the carrier concn. and the structural properties of the NASICON covalent skeleton. The results confirm that the Ti-based framework is more calibrated to Li+ migration than the Ge-based one. A grain cond. of 10-3 S cm-1 is obtained at 25.degree.C in the case of Li1.3Al0.3Ti1.7(PO4)3. A total cond. of about 6.times.10-5 S cm-1 is measured on **sintered** pellets because of grain boundary effects. The use of such ceramics in ISE devices has shown that the most confined unit cell (i.e., in Ge-based materials) is more appropriate for selectivity effect, although it is less conductive.

IT **120479-61-0P**, Aluminum lithium titanium phosphate Al0.3Li1.3Ti1.7(PO4)3 **163119-09-3P**, Aluminum lithium titanium phosphate Al0.6Li1.6Ti1.4(PO4)3 **214119-31-0P**, Aluminum lithium titanium phosphate Al0.1Li1.1Ti1.9(PO4)3 **253129-60-1P**, Aluminum lithium titanium phosphate (Al0.7Li1.7Ti1.3(PO4)3)
(Li ion conductor; sol-gel prepn. and properties of NASICON-type Al Li Ti phosphate and Al Ge Li phosphate lithium ion conductors for use as Li+ sensitive membranes)

RN 120479-61-0 HCA

CN Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

RN 163119-09-3 HCA
CN Aluminum lithium titanium phosphate (Al0.6Li1.6Ti1.4(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.4	7440-32-6
Li	1.6	7439-93-2
Al	0.6	7429-90-5

RN 214119-31-0 HCA
CN Aluminum lithium titanium phosphate (Al0.1Li1.1Ti1.9(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Li	1.1	7439-93-2
Al	0.1	7429-90-5

RN 253129-60-1 HCA
CN Aluminum lithium titanium phosphate (Al0.7Li1.7Ti1.3(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.3	7440-32-6
Li	1.7	7439-93-2
Al	0.7	7429-90-5

CC 57-2 (Ceramics)
Section cross-reference(s): 76

IT 30622-39-0P, Lithium titanium phosphate LiTi2(PO4)3 78538-41-7P, Germanium Lithium phosphate Ge2Li(PO4)3 108431-08-9P, Aluminum germanium lithium phosphate Al0.5Ge1.5Li1.5(PO4)3 119356-70-6P, Aluminum germanium lithium phosphate Al0.1Ge1.9Li1.1(PO4)3 119356-72-8P, Aluminum germanium lithium phosphate Al0.3Ge1.7Li1.3(PO4)3 119356-74-0P, Aluminum germanium lithium phosphate Al0.6Ge1.4Li1.6(PO4)3 **120479-61-0P**, Aluminum lithium titanium phosphate Al0.3Li1.3Ti1.7(PO4)3 131266-83-6P, Aluminum lithium titanium phosphate Al0.5Li1.5Ti1.5(PO4)3 144048-59-9P, Aluminum germanium lithium phosphate Al0.7Ge1.3Li1.7(PO4)3 **163119-09-3P**, Aluminum lithium titanium phosphate Al0.6Li1.6Ti1.4(PO4)3 **214119-31-0P**, Aluminum lithium titanium phosphate Al0.1Li1.1Ti1.9(PO4)3

253129-60-1P, Aluminum lithium titanium phosphate (Al0.7Li1.7Ti1.3(PO4)3)
(Li ion conductor; sol-gel prepn. and properties of NASICON-type Al Li Ti phosphate and Al Ge Li phosphate lithium ion conductors for use as Li+ sensitive membranes)

L23 ANSWER 3 OF 4 HCA COPYRIGHT 2002 ACS
130:184798 A first approach to a monolithic all solid state inorganic lithium **battery**. Birke, P.; Salam, F.; Doring, S.; Weppner, W. (Technical Faculty, Sensors and Solid State Ionics, Christian Albrechts University, Kiel, D-24143, Germany). Solid State Ionics, 118(1,2), 149-157 (English) 1999. CODEN: SSIOD3. ISSN: 0167-2738. Publisher: Elsevier Science B.V..

AB We investigated the feasibility of a monolithic, fully inorg. solid state lithium **battery**. The main requirements for such an inorg. **battery** are a ceramic lithium **electrolyte** with high ionic cond. and a large stability window, and a second ion conductor which acts as **sintering** additive within the whole **battery** to prevent high prepn. temps. which may cause undesired thermodn. reactions between the **electrodes** and the **electrolyte** prior to the first charge of the **battery**. This **sintering** additive must at no time react with the pos. lithium transition metal oxide **electrode** where the oxidn. state of the transition metal may easily change. For these reasons, the reproducibility of the high reported ionic cond. of Li1.3Al0.3Ti1.7(PO4)3 and the lithium-rich and lithium-poor stability limits have been investigated. For **sintering** additive 0.44 LiBO2.cntdot.0.56 LiF has been tested. First cycling results on the system Li4Ti5O12|Li1.3Al0.3Ti1.7(PO4)3|LiMn2O4 are presented.

IT **120479-61-0**, Aluminum lithium titanium phosphate Al0.3Li1.3Ti1.7(PO4)3
(monolithic all solid state inorg. lithium **battery**)

RN 120479-61-0 HCA
CN Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57
ST lithium **battery** all solid state inorg
IT Glass, uses
(lithium borate fluoride, **sintering** additive; monolithic all solid state inorg. lithium **battery**)

IT Primary **batteries**
(lithium; monolithic all solid state inorg. lithium **battery**)
IT Ionic conductivity
Sintering aids
(monolithic all solid state inorg. lithium **battery**)
IT 7789-24-4, Lithium fluoride, uses 13453-69-5, Lithium borate libo2
(glass, **sintering** additive; monolithic all solid state inorg. lithium **battery**)
IT 12031-95-7, Lithium titanium oxide Li4Ti5O12 12057-17-9, Lithium manganese oxide limn2o4 **120479-61-0**, Aluminum lithium titanium phosphate Al0.3Li1.3Ti1.7(PO4)3
(monolithic all solid state inorg. lithium **battery**)

L23 ANSWER 4 OF 4 HCA COPYRIGHT 2002 ACS
124:35522 Study of Li1+xAlxTi2-x(PO4)3 for Li+ potentiometric sensors.
Cretin, M.; Fabry, P.; Abello, L. (Lab. Ionique Electrochim. Solide Grenoble, CNRS URA, Saint Martin d'Heres, 38402, Fr.). Journal of the European Ceramic Society, 15(11), 1149-56 (English) 1995. CODEN: JECSER. ISSN: 0955-2219. Publisher: Elsevier.
AB Mineral compds. Li1+xAlxTi2-x(PO4)3 (x = 0 and x = 0.3) have been made by co-grinding and sol-gel processes. Structural characterizations by x-ray diffraction and Raman spectroscopy indicate that alumina substitution (x = 0.3) does not modify the crystallog. structure, whatever the synthesis process: compds. crystallize in the rhombohedral system with an R-3C space group. The use of the sol-gel route makes low-temp. **sintering** (950.degree.C) easier and, moreover, leads to ceramics with a high water stability. Li1.3Al0.3Ti1.7(PO4)3 compds. are fast ionic conductors: .sigma.25.degree.C varies from 15-5 to 10-4 S cm-1, depending on the synthesis process. They have been used as ionic membranes for lithium-selective **electrodes**. Sensors prepd. with sol-gel membranes have the best performance: the detection limit is 1.4 .times. 10-4 mol dm-3. The potassium and the protonic selectivity properties are attractive for such **electrodes**. For sodium, they need to be improved for biomedical applications.
IT **120479-61-0**, Aluminum lithium titanium phosphate al0.3li1.3ti1.7(po4)3
(sensors, potentiometric; low-temp. processing and properties of Li1+xAlxTi2-x(PO4)3 potentiometric sensors for Li+)
RN 120479-61-0 HCA
CN Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

CC 57-2 (Ceramics)
Section cross-reference(s): 47, 76
IT **Electrodes**
(lithium-selective, low-temp. processing and properties of Li1+xAlxTi2-x(PO4)3 potentiometric sensors for Li+)
IT 30622-39-0, Lithium titanium phosphate liti2(po4)3
120479-61-0, Aluminum lithium titanium phosphate al0.3li1.3ti1.7(po4)3
(sensors, potentiometric; low-temp. processing and properties of Li1+xAlxTi2-x(PO4)3 potentiometric sensors for Li+)

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L24 ANSWER 1 OF 10 HCA COPYRIGHT 2002 ACS
135:365256 Non-**sintered** lithium ion-conductive solid **electrolytes**. Takada, Kazunori; Kondo, Shigeo; Watanabe, Jun; Inada, Taro; Kajiyama, Akihisa; Kouguchi, Masaru (National Institute for Research In Inorganic Materials, Japan; Toda Kogyo Corp.; Japan Storage Battery Co., Ltd.; Denki Kagaku Kogyo Co., Ltd.). Jpn. Kokai Tokkyo Koho JP 2001319520 A2 20011116, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-134106 20000508.
AB The **electrolytes**, useful for **batteries**, are manufd. by mixing Li ion-conductive amorphous solid **electrolytes** and phosphate salts contg. Li and Ti. The phosphate salts may be Li1+xTi2-xMx(PO4)3 (M = ions of Al, Cr, Ga, Fe, Sc, In, Y, La; x = 0-0.5) and the amorphous **electrolytes** may be sulfides.
IT **120479-61-0P**, Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3)
(non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
RN 120479-61-0 HCA
CN Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

IC ICM H01B001-06
ICS C01B025-45; H01M006-18; H01M010-36
CC 76-2 (Electric Phenomena)
Section cross-reference(s): **52**, 57
ST lithium ion conductor nonsintered solid **electrolyte**; titanium lithium phosphate amorphous solid **electrolyte**; sulfide glass nonsintered solid **electrolyte**

battery
IT Sulfide glasses
(lithium phosphorus sulfide; non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
IT Phosphate glasses
(lithium silicon phosphate sulfide; non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
IT Fuel **cell electrolytes**
Solid **electrolytes**
(non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
IT 12136-58-2P, Lithium sulfide (Li2S)
(glass contg.; non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
IT 30622-39-0P, Lithium titanium phosphate (LiTi2(PO4)3)
120479-61-0P, Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3)
(non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
IT 10377-52-3P, Lithium phosphate 13759-10-9P, Silicon sulfide (SiS2)
(oxysulfide glass contg.; non-**sintered** Li-conductive solid **electrolytes** for **batteries**)
IT 1314-80-3P, Phosphorus sulfide (P2S5)
(sulfide glass contg.; non-**sintered** Li-conductive solid **electrolytes** for **batteries**)

L24 ANSWER 2 OF 10 HCA COPYRIGHT 2002 ACS
128:77543 Ionic conductivity enhancement in LiGe2(PO4)3 solid **electrolyte**. Yamamoto, Hiroshi; Tabuchi, Mitsuharu; Takeuchi, Tomonari; Kageyama, Hiroyuki; Nakamura, Osamu (Amagasaki, 1 Nishino-cho Higashimukojima, Advanced Technology Research Laboratories, Sumitomo Metal Industries, Ltd., Hyogo 660, Japan). Journal of Power Sources, 68(2), 397-401 (English) 1997. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science S.A..
AB To improve the ionic cond. of LiGe2(PO4)3 as a solid **electrolyte** for lithium **batteries**, the authors have examd. the effects of Al3+ and Y3+ substitution for Ge4+ and of LiOH.cntdot.H2O addn. on the ionic cond. The ionic cond. of LiGe2(PO4)3 is enhanced four orders of magnitude by Al3+ addn., i.e., 1.3 .times. 10-4 S/cm at 23.degree. in case of the Li1.4Al0.4Ge1.6(PO4)3. The addn. of Y2O3 or lithium salt also enhances the ionic cond. because of the acceleration of the **sintering** process by the second phase of Li4P2O7.
IT **200496-89-5**, Germanium lithium yttrium phosphate (Ge1.6Li1.4Y0.4(PO4)3) **200496-90-8**, Germanium lithium yttrium phosphate (Ge1.8Li1.2Y0.2(PO4)3)
(ionic cond. of germanium lithium yttrium phosphate solid **battery electrolytes**)
RN 200496-89-5 HCA
CN Germanium lithium yttrium phosphate (Ge1.6Li1.4Y0.4(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Y	0.4	7440-65-5
Ge	1.6	7440-56-4
Li	1.4	7439-93-2

RN 200496-90-8 HCA
CN Germanium lithium yttrium phosphate (Ge1.8Li1.2Y0.2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Y	0.2	7440-65-5
Ge	1.8	7440-56-4
Li	1.2	7439-93-2

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76
ST germanium lithium phosphate **electrolyte** ionic cond; aluminum germanium lithium phosphate **electrolyte** cond; yttrium germanium lithium phosphate **electrolyte** cond; **battery** germanium lithium phosphate **electrolyte** cond
IT **Battery electrolytes**
Ionic conductivity
(ionic cond. enhancement of germanium lithium phosphate solid **battery electrolytes** by addn. of aluminum oxide, yttrium oxide, or lithium salt)
IT 78538-41-7, Germanium lithium phosphate [Ge2Li(PO4)3]
(ionic cond. enhancement of germanium lithium phosphate solid **battery electrolytes** by addn. of aluminum oxide, yttrium oxide, or lithium salt)
IT 1310-66-3, Lithium hydroxide hydrate 1314-36-9, Yttria, uses 1344-28-1, Alumina, uses
(ionic cond. enhancement of germanium lithium phosphate solid **battery electrolytes** by addn. of aluminum oxide, yttrium oxide, or lithium salt)
IT 119356-71-7, Aluminum germanium lithium phosphate [Al0.2Ge1.8Li1.2(PO4)3] 119356-73-9, Aluminum germanium lithium phosphate [Al0.4Ge1.6Li1.4(PO4)3]
(ionic cond. of aluminum germanium lithium phosphate solid **battery electrolytes**)
IT **200496-89-5**, Germanium lithium yttrium phosphate (Ge1.6Li1.4Y0.4(PO4)3) **200496-90-8**, Germanium lithium yttrium phosphate (Ge1.8Li1.2Y0.2(PO4)3)
(ionic cond. of germanium lithium yttrium phosphate solid

battery electrolytes)

L24 ANSWER 3 OF 10 HCA COPYRIGHT 2002 ACS
121:146570 Ceramic solid **electrolyte** obtained by **sintering**. Nakayama, Susumu; Kuroshima, Hiroshi (Shinagawa Refractories Co, Japan). Jpn. Kokai Tokkyo Koho JP 06080462 A2 19940322 Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-231856 19920831.
AB The solid **electrolyte** is obtained by mixing a ceramic **electrolyte** with high elec. cond. with .ltoreq.40 wt.% ionic conductor **electrolyte** contg. the same ions as those of the ceramic **electrolyte** and more glass components and **sintering**. The **electrolyte** obtained by **sintering** at 900-1100.degree. showed high elec. cond.
IT **150232-17-0**, Indium lithium titanium phosphate (In0.4Li1.4Ti1.6(PO4)3)
(ceramics, low-temp. **sintering** of, solid **electrolyte** from)
RN 150232-17-0 HCA
CN Indium lithium titanium phosphate (In0.4Li1.4Ti1.6(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
In	0.4	7440-74-6
Ti	1.6	7440-32-6
Li	1.4	7439-93-2

IC ICM C04B035-00
ICS H01B001-06
CC 76-2 (Electric Phenomena)
Section cross-reference(s): 57
ST ceramic oxide **electrolyte** solid **sintering**
IT Electric conductors, ceramic
(oxide, manuf. of, by low-temp. **sintering**, with high elec. cond., for solid **electrolyte**)
IT 6834-92-0 7601-54-9, Sodium phosphate 10102-24-6, Lithium silicon oxide (Li2SiO3) 10377-52-3, Lithium phosphate 12003-51-9 12003-67-7, Lithium aluminum oxide (LiAlO2) 13465-88-8 13465-97-9, Silver phosphorus oxide (Ag4P2O7) 13497-94-4, Silver vanadium oxide (AgVO3) 16625-98-2 19497-94-0 22307-58-0 28132-50-5, Sodium zirconium phosphate [Na2Zr(PO4)2] 34370-43-9 58572-20-6, Sodium zirconium phosphate silicate (Na3Zr2(PO4)(SiO4)2) 76572-26-4 129039-87-8, Silver zirconium phosphate silicate (Ag3Zr2(PO4)(SiO4)2) **150232-17-0**, Indium lithium titanium phosphate (In0.4Li1.4Ti1.6(PO4)3) 157281-79-3, Lithium samarium oxide silicate (Li4Sm2O(SiO4)2) 157281-80-6, Gadolinium sodium oxide silicate (Gd2Na4O(SiO4)2)
(ceramics, low-temp. **sintering** of, solid **electrolyte** from)

IT 157322-04-8P 157322-05-9P 157322-06-0P 157322-07-1P
157322-08-2P, Indium lithium phosphorus titanium oxide
157322-09-3P 157322-10-6P 157322-11-7P 157322-12-8P
157322-13-9P 157322-14-0P 157322-15-1P 157322-16-2P
157322-17-3P
(ceramics, solid **electrolyte**, prepn. of, by low-temp. **sintering**, with high elec. cond.)

L24 ANSWER 4 OF 10 HCA COPYRIGHT 2002 ACS
120:111719 Solid **electrolytes** and lithium **batteries** using the **electrolytes**. Shoji, Yoshihiro; Nishio, Koji; Furukawa, Sanehiro (Sanyo Electric Co., Japan). Jpn. Kokai Tokkyo Koho JP 05299101 A2 19931112 Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-180349 19920615. PRIORITY: JP 1992-69472 19920218.

AB The **electrolytes** are **sintered** products of Li1+(4-n)xMxTi2-x(PO4)3 granules, where M is mono- or di-valent cations, n = valence of the cation, and x = 0.1-0.5. The **electrolyte** may also be a **sintered** mixt. of the above granules and a 2nd low. m.p. **electrolyte** granules of smaller size. The 2nd **electrolyte** granules are preferably Li1+(4-n)xMxZr2-x(PO4)3.

IT **152829-88-4**, Lithium magnesium zirconium phosphate (Li1.4Mg0.2Zr1.8(PO4)3) **152829-90-8**, Iron lithium zirconium phosphate (Fe0.2Li1.4Zr1.8(PO4)3) **152829-94-2**, Lithium magnesium zirconium phosphate (Li1.2Mg0.1Zr1.9(PO4)3) **152829-95-3**, Lithium magnesium zirconium phosphate (Li1.6Mg0.3Zr1.7(PO4)3) **152829-97-5**, Iron lithium titanium phosphate (Fe0.1Li1.2Ti1.9(PO4)3) **152829-98-6**, Iron lithium titanium phosphate (Fe0.3Li1.6Ti1.7(PO4)3) **152830-00-7**, Iron lithium titanium phosphate (Fe0.5Li1.2Ti1.9(PO4)3) **152830-01-8**, Iron lithium zirconium phosphate (Fe0.3Li1.6Zr1.7(PO4)3)
(**electrolyte** contg., for lithium **batteries**)

RN 152829-88-4 HCA
CN Lithium magnesium zirconium phosphate (Li1.4Mg0.2Zr1.8(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.8	7440-67-7
Mg	0.2	7439-95-4
Li	1.4	7439-93-2

RN 152829-90-8 HCA
CN Iron lithium zirconium phosphate (Fe0.2Li1.4Zr1.8(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number

O4P	3	14265-44-2
Zr	1.8	7440-67-7
Li	1.4	7439-93-2
Fe	0.2	7439-89-6

RN 152829-94-2 HCA
CN Lithium magnesium zirconium phosphate (Li1.2Mg0.1Zr1.9(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.9	7440-67-7
Mg	0.1	7439-95-4
Li	1.2	7439-93-2

RN 152829-95-3 HCA
CN Lithium magnesium zirconium phosphate (Li1.6Mg0.3Zr1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.7	7440-67-7
Mg	0.3	7439-95-4
Li	1.6	7439-93-2

RN 152829-97-5 HCA
CN Iron lithium titanium phosphate (Fe0.1Li1.2Ti1.9(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Li	1.2	7439-93-2
Fe	0.1	7439-89-6

RN 152829-98-6 HCA
CN Iron lithium titanium phosphate (Fe0.3Li1.6Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.6	7439-93-2

Fe	0.3	7439-89-6

RN 152830-00-7 HCA
CN Iron lithium titanium phosphate (Fe0.5Li1.2Ti1.9(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Li	1.2	7439-93-2
Fe	0.5	7439-89-6

RN 152830-01-8 HCA
CN Iron lithium zirconium phosphate (Fe0.3Li1.6Zr1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.7	7440-67-7
Li	1.6	7439-93-2
Fe	0.3	7439-89-6

IT **152829-87-3**, Lithium magnesium titanium phosphate (Li1.4Mg0.2Ti1.8(PO4)3) **152829-89-5**, Iron lithium titanium phosphate (Fe0.2Li1.4Ti1.8(PO4)3) **152829-91-9**, Lithium magnesium titanium phosphate (Li1.2Mg0.1Ti1.9(PO4)3) **152829-92-0**, Lithium magnesium titanium phosphate (Li1.6Mg0.3Ti1.7(PO4)3)
(**electrolyte**, for lithium **batteries**)
RN 152829-87-3 HCA
CN Lithium magnesium titanium phosphate (Li1.4Mg0.2Ti1.8(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.8	7440-32-6
Mg	0.2	7439-95-4
Li	1.4	7439-93-2

RN 152829-89-5 HCA
CN Iron lithium titanium phosphate (Fe0.2Li1.4Ti1.8(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number

O4P	3	14265-44-2
Ti	1.8	7440-32-6
Li	1.4	7439-93-2
Fe	0.2	7439-89-6

RN 152829-91-9 HCA
CN Lithium magnesium titanium phosphate (Li1.2Mg0.1Ti1.9(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Mg	0.1	7439-95-4
Li	1.2	7439-93-2

RN 152829-92-0 HCA
CN Lithium magnesium titanium phosphate (Li1.6Mg0.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Mg	0.3	7439-95-4
Li	1.6	7439-93-2

IC ICM H01M006-18
ICS H01M010-36
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium **battery electrolyte**; lithium titanium phosphate **battery electrolyte**; zirconium lithium phosphate **battery electrolyte**
IT **Battery electrolytes**
(lithium titanium phosphate and lithium zirconium phosphate, compns. of)
IT Electric conductivity and conduction
(of lithium titanium phosphate and lithium zirconium phosphate **electrolytes** for lithium **batteries**)
IT **152829-88-4**, Lithium magnesium zirconium phosphate (Li1.4Mg0.2Zr1.8(PO4)3) **152829-90-8**, Iron lithium zirconium phosphate (Fe0.2Li1.4Zr1.8(PO4)3) 152829-93-1 **152829-94-2**, Lithium magnesium zirconium phosphate (Li1.2Mg0.1Zr1.9(PO4)3) **152829-95-3**, Lithium magnesium zirconium phosphate (Li1.6Mg0.3Zr1.7(PO4)3) 152829-96-4 **152829-97-5**, Iron lithium titanium phosphate (Fe0.1Li1.2Ti1.9(PO4)3) **152829-98-6**, Iron lithium titanium phosphate (Fe0.3Li1.6Ti1.7(PO4)3) 152829-99-7 **152830-00-7**, Iron lithium titanium phosphate (Fe0.5Li1.2Ti1.9(PO4)3)

152830-01-8, Iron lithium zirconium phosphate (Fe0.3Li1.6Zr1.7(PO4)3) 152830-02-9
(**electrolyte** contg., for lithium **batteries**)

IT **152829-87-3**, Lithium magnesium titanium phosphate (Li1.4Mg0.2Ti1.8(PO4)3) **152829-89-5**, Iron lithium titanium phosphate (Fe0.2Li1.4Ti1.8(PO4)3) **152829-91-9**, Lithium magnesium titanium phosphate (Li1.2Mg0.1Ti1.9(PO4)3) **152829-92-0**, Lithium magnesium titanium phosphate (Li1.6Mg0.3Ti1.7(PO4)3)
(**electrolyte**, for lithium **batteries**)

L24 ANSWER 5 OF 10 HCA COPYRIGHT 2002 ACS

119:192527 The electrical properties of ceramic **electrolytes** for lithium metal titanium phosphate (LiMxTi2-x(PO4)3 + dilithium oxide, M = germanium, tin, hafnium, and zirconium systems. Aono, Hiromichi; Sugimoto, Eisuki; Sadaoka, Yoshihiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Journal of the Electrochemical Society, 140(7), 1827-33 (English) 1993. CODEN: JESOAN. ISSN: 0013-4651.

AB The elec. properties of systems of LiMxTi2-x(PO4)3 + yLi2O (M = Ge, Sn, Hf, Zr) were examd. The cond. and the **sinterability** increased with the amt. of excess Li2O in the phosphate. The secondary Li2O phase acts as a flux to accelerate the **sintering** process and to obtain high cond. grain boundaries. The cond. decreased and the activation energy of the bulk component for Li+ migration increased by the partial substitution of Ti4+ for M4+ in systems of LiMxTi2-x(PO4)3 + 0.2Li2O. A min. activation energy of 0.28-0.30 eV, was obtained for the sample with .apprx.1310 .ANG.3 in the cell vol. LiTi2(PO4)3 has the most suitable tunnel size for a Li+ migration through the NASICON-type network structure.

IT **150477-37-5 150477-38-6**, Hafnium lithium titanium oxide phosphate ((Hf,Ti)2Li1.4O0.2(PO4)3) **150477-39-7**, Lithium tin titanium oxide phosphate (Li1.4(Sn,Ti)2O0.2(PO4)3) **150477-40-0**
(crystal structure and elec. cond. of, compn. effect on)

RN 150477-37-5 HCA

CN Lithium titanium zirconium oxide phosphate (Li1.4(Ti,Zr)2O0.2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0.2	17778-80-2
O4P	3	14265-44-2
Zr	0 - 2	7440-67-7
Ti	0 - 2	7440-32-6
Li	1.4	7439-93-2

RN 150477-38-6 HCA

CN Hafnium lithium titanium oxide phosphate ((Hf,Ti)2Li1.4O0.2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0.2	17778-80-2
O4P	3	14265-44-2
Hf	0 - 2	7440-58-6
Ti	0 - 2	7440-32-6
Li	1.4	7439-93-2

RN 150477-39-7 HCA
CN Lithium tin titanium oxide phosphate (Li1.4(Sn,Ti)2O0.2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0.2	17778-80-2
O4P	3	14265-44-2
Ti	0 - 2	7440-32-6
Sn	0 - 2	7440-31-5
Li	1.4	7439-93-2

RN 150477-40-0 HCA
CN Germanium lithium titanium oxide phosphate ((Ge,Ti)2Li1.4O0.2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0.2	17778-80-2
O4P	3	14265-44-2
Ge	0 - 2	7440-56-4
Ti	0 - 2	7440-32-6
Li	1.4	7439-93-2

IT **150477-41-1**, Lithium zirconium oxide phosphate (Li1-2Zr2O0-0.5(PO4)3) **150477-42-2**, Hafnium lithium oxide phosphate (Hf2Li1-1.8O0-0.4(PO4)3) **150477-44-4**, Lithium titanium oxide phosphate (Li1-1.8Ti2O0-0.4(PO4)3) (porosity and elec. cond. and crystal structure of, compn. effect on)
RN 150477-41-1 HCA
CN Lithium zirconium oxide phosphate (Li1-2Zr2O0-0.5(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0 - 0.5	17778-80-2
O4P	3	14265-44-2
Zr	2	7440-67-7
Li	1 - 2	7439-93-2

RN 150477-42-2 HCA
CN Hafnium lithium oxide phosphate (Hf2Li1-1.8O0-0.4(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0 - 0.4	17778-80-2
O4P	3	14265-44-2
Hf	2	7440-58-6
Li	1 - 1.8	7439-93-2

RN 150477-44-4 HCA
CN Lithium titanium oxide phosphate (Li1-1.8Ti2O0-0.4(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	0 - 0.4	17778-80-2
O4P	3	14265-44-2
Ti	2	7440-32-6
Li	1 - 1.8	7439-93-2

CC 76-1 (Electric Phenomena)
Section cross-reference(s): 75
IT **150477-37-5** **150477-38-6**, Hafnium lithium titanium oxide phosphate ((Hf,Ti)2Li1.4O0.2(PO4)3) **150477-39-7**, Lithium tin titanium oxide phosphate (Li1.4(Sn,Ti)2O0.2(PO4)3) **150477-40-0**
(crystal structure and elec. cond. of, compn. effect on)
IT 19527-80-1, Lithium zirconium phosphate lizr2(po4)3 19527-83-4, Hafnium lithium phosphate hf2li(po4)3 30622-39-0, Lithium titanium phosphate liti2(po4)3 58797-94-7, Lithium tin phosphate lisn2(po4)3 78538-41-7, Germanium lithium phosphate ge2li(po4)3
(elec. cond. and crystal structure of, lithium oxide addns. and **sintering** effect on)
IT **150477-41-1**, Lithium zirconium oxide phosphate (Li1-2Zr2O0-0.5(PO4)3) **150477-42-2**, Hafnium lithium oxide phosphate (Hf2Li1-1.8O0-0.4(PO4)3) 150477-43-3, Lithium tin oxide phosphate (Li1-1.8Sn2O0-0.4(PO4)3) **150477-44-4**, Lithium titanium oxide phosphate (Li1-1.8Ti2O0-0.4(PO4)3) 150477-45-5, Germanium lithium oxide phosphate (Ge2Li1-1.8O0-0.4(PO4)3)
(porosity and elec. cond. and crystal structure of, compn. effect on)

L24 ANSWER 6 OF 10 HCA COPYRIGHT 2002 ACS
117:223861 Substitution effect of framework constituents on electrical property of solid **electrolytes** with .beta.-Fe2(SO4)3-type structure, M1+XZr2P3-XSiXO12 (M = Li, 1/2Mg, and 1/2Zn). Nomura, Katsuhiro; Ikeda, Shoichiro; Ito, Kaname; Einaga, Hisahiko (Fac.

Eng., Nagoya Inst. Technol., Nagoya, 466, Japan). Chemistry Letters (10), 1897-900 (English) 1992. CODEN: CMLTAG. ISSN: 0366-7022.

AB An enhancement of elec. cond. was obsd. by substitution of Si4+ for P5+ in LiZr2(PO4)3, MgZr4(PO4)6, and ZnZr4(PO4)6 solid **electrolytes** with a .beta.-Fe2(SO4)3-type structure. An increase in the concn. of interstitial Li+ ion resulted in the cond. enhancement for the Li compd., whereas an increase in the compactness of **sintered** specimen for the Mg and Zn compds.

IT **144390-73-8**, Lithium zirconium phosphate silicate (Li1.1Zr2(PO4)2.9(SiO4)0.1) **144390-74-9**, Lithium zirconium phosphate silicate (Li1.2Zr2(PO4)2.8(SiO4)0.2) **144390-75-0**, Lithium zirconium phosphate silicate (Li1.3Zr2(PO4)2.7(SiO4)0.3) **144390-76-1**, Lithium zirconium phosphate silicate (Li1.4Zr2(PO4)2.6(SiO4)0.4) **144390-77-2**, Lithium zirconium phosphate silicate (Li1.5Zr2(PO4)2.5(SiO4)0.5)
(elec. cond. of solid **electrolyte** of)

RN 144390-73-8 HCA
CN Lithium zirconium phosphate silicate (Li1.1Zr2(PO4)2.9(SiO4)0.1) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.1	17181-37-2
O4P	2.9	14265-44-2
Zr	2	7440-67-7
Li	1.1	7439-93-2

RN 144390-74-9 HCA
CN Lithium zirconium phosphate silicate (Li1.2Zr2(PO4)2.8(SiO4)0.2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.2	17181-37-2
O4P	2.8	14265-44-2
Zr	2	7440-67-7
Li	1.2	7439-93-2

RN 144390-75-0 HCA
CN Lithium zirconium phosphate silicate (Li1.3Zr2(PO4)2.7(SiO4)0.3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.3	17181-37-2
O4P	2.7	14265-44-2
Zr	2	7440-67-7
Li	1.3	7439-93-2

RN 144390-76-1 HCA
CN Lithium zirconium phosphate silicate (Li1.4Zr2(PO4)2.6(SiO4)0.4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.4	17181-37-2
O4P	2.6	14265-44-2
Zr	2	7440-67-7
Li	1.4	7439-93-2

RN 144390-77-2 HCA
CN Lithium zirconium phosphate silicate (Li1.5Zr2(PO4)2.5(SiO4)0.5) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.5	17181-37-2
O4P	2.5	14265-44-2
Zr	2	7440-67-7
Li	1.5	7439-93-2

CC 76-2 (Electric Phenomena)
ST cond solid **electrolyte** silicon substitution; lithium zirconium silicon phosphate cond; magnesium silicon zirconium phosphate cond; zinc zirconium phosphate silicate cond
IT Electric conductivity and conduction
(of solid-**electrolytes** phosphates, silicon substitution effect on)
IT 67972-93-4 **144390-73-8**, Lithium zirconium phosphate silicate (Li1.1Zr2(PO4)2.9(SiO4)0.1) **144390-74-9**, Lithium zirconium phosphate silicate (Li1.2Zr2(PO4)2.8(SiO4)0.2) **144390-75-0**, Lithium zirconium phosphate silicate (Li1.3Zr2(PO4)2.7(SiO4)0.3) **144390-76-1**, Lithium zirconium phosphate silicate (Li1.4Zr2(PO4)2.6(SiO4)0.4) **144390-77-2**, Lithium zirconium phosphate silicate (Li1.5Zr2(PO4)2.5(SiO4)0.5) 144390-78-3, Magnesium zirconium phosphate silicate (Mg1.05Zr4(PO4)5.9(SiO4)0.1) 144390-79-4, Magnesium zirconium phosphate silicate (Mg1.1Zr4(PO4)5.8(SiO4)0.2) 144390-80-7, Magnesium zirconium phosphate silicate (Mg1.15Zr4(PO4)5.7(SiO4)0.3) 144390-81-8, Magnesium zirconium phosphate silicate (Mg1.2Zr4(PO4)5.6(SiO4)0.4) 144390-82-9, Magnesium zirconium phosphate silicate (Mg1.25Zr4(PO4)5.5(SiO4)0.5) 144390-83-0, Zinc zirconium phosphate silicate (Zn1.05Zr4(PO4)5.9(SiO4)0.1) 144390-84-1, Zinc zirconium phosphate silicate (Zn1.1Zr4(PO4)5.8(SiO4)0.2) 144390-85-2, Zinc zirconium phosphate silicate (Zn1.15Zr4(PO4)5.7(SiO4)0.3) 144390-86-3, Zinc zirconium phosphate silicate (Zn1.2Zr4(PO4)5.6(SiO4)0.4) 144390-87-4, Zinc zirconium phosphate silicate (Zn1.25Zr4(PO4)5.5(SiO4)0.5)
(elec. cond. of solid **electrolyte** of)

IT 62585-92-6
(elec. cond. of solid **electrolyte** of, effect of silicon substitution on)
IT 19527-80-1
(elec. cond. of solid **electrolyte**, effect of silicon substitution in)
IT 7440-21-3, Silicon, properties
(elec. cond. of solid-**electrolyte** phosphates affected by substitution with)

L24 ANSWER 7 OF 10 HCA COPYRIGHT 2002 ACS
117:202629 Electrical properties and **sinterability** for lithium germanium phosphate Li1+xMxGe2-x(PO4)3, M = aluminum, chromium, gallium, iron, scandium, and indium systems. Aono, Hiromichi; Sugimoto, Eisuke; Sadaoka, Yoshhiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Bulletin of the Chemical Society of Japan, 65(8), 2200-4 (English) 1992. CODEN: BCSJA8. ISSN: 0009-2673.
AB The elec. properties and **sinterability** were studied for Li1+xMxGe2-x(PO4)3, M = Al3+, Cr3+, Ga3+, Fe3+, Se3+, and In3+ systems. Due to the closer ionic radius of Al3+ and Cr3+ compared to that of Ge4+, those M3+ ions easily substitute the Ge4+ site. Larger cations, such as Ga3+, Fe3+, Sc3+, and In3+, were difficult to substitute the Ge4+ site. The ionic cond. and **sinterability** improved with an increase in x for all of the M3+-substituted systems. In particular, an Al3+- or Cr3+-substituted system shows higher cond.; the max. cond. is 2.4.times.10-4 S cm-1 at 298 ~K for Li1.5Al0.5Ge1.5(PO4)3. The enhancement in the cond. is attributed to a decrease in the porosity and a lowering of the activation energy in the grain boundaries. The activation energy for Li+ ion conduction of the bulk component was 0.38 eV for Li1+xMxGe2-x(PO4)3 **electrolytes**, and was almost independent of M3+ substitution.
IT **108730-48-9**, Chromium germanium lithium phosphate(cr0.3ge1.7li1.3(po4)3) **144048-56-6**, Germanium iron lithium phosphate (Ge1.7Fe0.3Li1.3(PO4)3) **144048-57-7**, Germanium lithium scandium phosphate (Ge1.7Li1.3Sc0.3(PO4)3) **144048-60-2**, Chromium germanium lithium phosphate (Cr0.7Ge1.3Li1.7(PO4)3)
(elec. cond. of)
RN 108730-48-9 HCA
CN Chromium germanium lithium phosphate (Cr0.3Ge1.7Li1.3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.7	7440-56-4
Cr	0.3	7440-47-3
Li	1.3	7439-93-2

RN 144048-56-6 HCA
CN Germanium iron lithium phosphate (Ge1.7Fe0.3Li1.3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.7	7440-56-4
Li	1.3	7439-93-2
Fe	0.3	7439-89-6

RN 144048-57-7 HCA
CN Germanium lithium scandium phosphate (Ge1.7Li1.3Sc0.3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.7	7440-56-4
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

RN 144048-60-2 HCA
CN Chromium germanium lithium phosphate (Cr0.7Ge1.3Li1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.3	7440-56-4
Cr	0.7	7440-47-3
Li	1.7	7439-93-2

CC 76-2 (Electric Phenomena)
IT 78538-41-7, Germanium lithium phosphate(ge2li(po4)3) 108431-08-9 **108730-48-9**, Chromium germanium lithium phosphate(cr0.3ge1.7li1.3(po4)3) 109210-49-3 119356-72-8, Aluminum germanium lithium phosphate(al0.3ge1.7li1.3(po4)3) 144048-55-5, Gallium germanium lithium phosphate (Ga0.3Ge1.7Li1.3(PO4)3) **144048-56-6**, Germanium iron lithium phosphate (Ge1.7Fe0.3Li1.3(PO4)3) **144048-57-7**, Germanium lithium scandium phosphate (Ge1.7Li1.3Sc0.3(PO4)3) 144048-58-8, Germanium indium lithium phosphate (Ge1.7In0.3Li1.3(PO4)3) 144048-59-9, Aluminum germanium lithium phosphate (Al0.7Ge1.3Li1.7(PO4)3) **144048-60-2**, Chromium germanium lithium phosphate (Cr0.7Ge1.3Li1.7(PO4)3) 144189-67-3 144189-68-4 144189-69-5 144189-70-8
(elec. cond. of)

L24 ANSWER 8 OF 10 HCA COPYRIGHT 2002 ACS
114:27157 Electrical properties of **sintered** lithium titanium phosphate ceramics (Li1+xMxTi2-x(PO4)3, M3+ = Al3+, Sc3+, Y3+). Aono, Hiromichi; Sugimoto, Eisuke; Sadaoka, Yoshihiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Chemistry Letters (10), 1825-8 (English) 1990. CODEN: CMLTAG. ISSN: 0366-7022.

AB The activation energy of ionic cond. was measured for bulk and grain boundary of Li1+xMxTi2-x(PO4)3 ceramic systems (M = Al, Sc, Y; x = 0.0-0.5), to select suitable materials for solid **electrolyte batteries**. The total cond. of the systems increased with trivalent cation content for all the metals and is attributed to a decrease in the activation energy of cond. of the grain boundary.

IT **127887-18-7**, Lithium scandium titanium phosphate [Li1.3Sc0.3Ti1.7(PO4)3] **131266-84-7 131266-85-8 131266-87-0 131266-88-1 131329-45-8**
(elec. cond. of ceramic, bulk and grain boundary, activation energy of, for **battery electrolyte**)

RN 127887-18-7 HCA
CN Lithium scandium titanium phosphate (Li1.3Sc0.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

RN 131266-84-7 HCA
RN 131266-85-8 HCA
CN Lithium scandium titanium phosphate (Li1.4Sc0.4Ti1.6(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.6	7440-32-6
Sc	0.4	7440-20-2
Li	1.4	7439-93-2

RN 131266-87-0 HCA
CN Lithium titanium yttrium phosphate (Li1.2Ti1.8Y0.2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Y	0.2	7440-65-5

Ti	1.8	7440-32-6
Li	1.2	7439-93-2

RN 131266-88-1 HCA
RN 131329-45-8 HCA
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57, 76
ST lithium titanium phosphate ceramic cond; aluminum lithium titanium phosphate cond; scandium lithium titanium phosphate cond; yttrium lithium titanium phosphate cond; **battery electrolyte** ceramic phosphate cond
IT Electric conductivity and conduction
(of lithium metal titanium phosphate ceramics, metal substituent effect on, for **battery electrolyte**)
IT **Batteries**, secondary
(solid-**electrolyte**, lithium metal titanium phosphate ceramics for, elec. cond. of, metal substituent effect on)
IT 30622-39-0, Lithium titanium phosphate [LiTi2(PO4)3]
127887-18-7, Lithium scandium titanium phosphate [Li1.3Sc0.3Ti1.7(PO4)3] 131266-80-3 131266-81-4 131266-82-5
131266-83-6 **131266-84-7 131266-85-8**
131266-86-9 **131266-87-0 131266-88-1**
131266-89-2 **131329-45-8**
(elec. cond. of ceramic, bulk and grain boundary, activation energy of, for **battery electrolyte**)

L24 ANSWER 9 OF 10 HCA COPYRIGHT 2002 ACS
113:32564 Ionic conductivity of solid **electrolytes** based on lithium titanium phosphate. Aono, Hiromichi; Sugimoto, Eisuke; Sadaoka, Yoshihiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Journal of the Electrochemical Society, 137(4), 1023-7 (English) 1990. CODEN: JESOAN. ISSN: 0013-4651.
AB Solid **electrolytes** based on lithium titanium phosphate were prepd., and their phase, porosity of the **sintered** pellets, and elec. cond. were studied. The cond. was increased and the porosity decreased greatly by partially replacing Ti4+ and P5+ in LiTi2(PO4)3 with M3+ (M3+ = Al3+, Cr3+, Ga3+, Fe3+, Sc3+, In3+, Lu3+, Y3+, and La3+) and Si4+ ions, resp. The max. cond. at 298 K is 7 .times. 10-4 S cm-1 for Li1.3M0.3Ti1.7(PO4)3 (M = Al and Sc). The cond. was considerably increased by the mixing of binders such as Li2O or Li4P2O7 with LiTi2(PO4)3. The main reason for the cond. enhancement of these **electrolytes** seems to be attributable to the increase of the **sintered** pellet d. with the enhancement of the lithium concn. at the grain boundaries.
IT **120479-61-0**, Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) **120479-62-1**, Lanthanum lithium titanium phosphate (La0-0.5Li1-1.5Ti1.5-2(PO4)3) **120479-63-2**, Lithium titanium yttrium phosphate (Li1-1.5Ti1.5-2Y0-0.5(PO4)3) **120479-64-3**, Lithium scandium titanium phosphate (Li1-1.5Sc0-0.5Ti1.5-2(PO4)3) **120479-65-4**, Aluminum

lithium titanium phosphate (Al0-0.5Li1-1.5Ti1.5-2(PO4)3)
127660-06-4, Iron lithium titanium phosphate
(Fe0-0.5Li1-1.5Ti1.5-2(PO4)3) **127660-07-5**, Gallium lithium
titanium phosphate (Ga0-0.5Li1-1.5Ti1.5-2(PO4)3) **127660-08-6**
, Chromium lithium titanium phosphate (Cr0-0.7Li1-1.7Ti1.3-2(PO4)3)
127660-09-7, Lithium titanium phosphate silicate
(Li1.4Ti2(PO4)2.6(SiO4)0.4) **127660-10-0**, Lithium titanium
phosphate silicate (Li1.3Ti2(PO4)2.7(SiO4)0.3) **127660-11-1**
, Lithium titanium phosphate silicate (Li1.2Ti2(PO4)2.8(SiO4)0.2)
127672-84-8, Lithium titanium phosphate silicate
(Li1.5Ti2(PO4)2.5(SiO4)0.5) **127673-06-7**, Lithium lutetium
titanium phosphate (Li1-1.5Lu0-0.5Ti1.5-2(PO4)3) **127673-07-8**
, Indium lithium titanium phosphate (In0-0.5Li1-1.5Ti1.5-2(PO4)3)
127689-78-5, Lanthanum lithium titanium phosphate
(La0.3Li1.3Ti1.7(PO)4)3) **127887-18-7**, Lithium scandium
titanium phosphate (Li1.3Sc0.3Ti1.7(PO4)3)
(ionic cond. and porosity and structure of)

RN 120479-61-0 HCA
CN Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

RN 120479-62-1 HCA
CN Lanthanum lithium titanium phosphate (La0-0.5Li1-1.5Ti1.5-2(PO4)3)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2
La	0 - 0.5	7439-91-0

RN 120479-63-2 HCA
CN Lithium titanium yttrium phosphate (Li1-1.5Ti1.5-2Y0-0.5(PO4)3)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Y	0 - 0.5	7440-65-5
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2

RN 120479-64-3 HCA
CN Lithium scandium titanium phosphate (Li1-1.5Sc0-0.5Ti1.5-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Sc	0 - 0.5	7440-20-2
Li	1 - 1.5	7439-93-2

RN 120479-65-4 HCA
CN Aluminum lithium titanium phosphate (Al0-0.5Li1-1.5Ti1.5-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2
Al	0 - 0.5	7429-90-5

RN 127660-06-4 HCA
CN Iron lithium titanium phosphate (Fe0-0.5Li1-1.5Ti1.5-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2
Fe	0 - 0.5	7439-89-6

RN 127660-07-5 HCA
CN Gallium lithium titanium phosphate (Ga0-0.5Li1-1.5Ti1.5-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ga	0 - 0.5	7440-55-3
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2

RN 127660-08-6 HCA
CN Chromium lithium titanium phosphate (Cr0-0.7Li1-1.7Ti1.3-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Cr	0 - 0.7	7440-47-3
Ti	1.3 - 2	7440-32-6
Li	1 - 1.7	7439-93-2

RN 127660-09-7 HCA
CN Lithium titanium phosphate silicate (Li1.4Ti2(PO4)2.6(SiO4)0.4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.4	17181-37-2
O4P	2.6	14265-44-2
Ti	2	7440-32-6
Li	1.4	7439-93-2

RN 127660-10-0 HCA
CN Lithium titanium phosphate silicate (Li1.3Ti2(PO4)2.7(SiO4)0.3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.3	17181-37-2
O4P	2.7	14265-44-2
Ti	2	7440-32-6
Li	1.3	7439-93-2

RN 127660-11-1 HCA
CN Lithium titanium phosphate silicate (Li1.2Ti2(PO4)2.8(SiO4)0.2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4Si	0.2	17181-37-2
O4P	2.8	14265-44-2
Ti	2	7440-32-6
Li	1.2	7439-93-2

RN 127672-84-8 HCA
CN Lithium titanium phosphate silicate (Li1.5Ti2(PO4)2.5(SiO4)0.5) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number

O4Si	0.5	17181-37-2
O4P	2.5	14265-44-2
Ti	2	7440-32-6
Li	1.5	7439-93-2

RN 127673-06-7 HCA
CN Lithium lutetium titanium phosphate (Li1-1.5Lu0-0.5Ti1.5-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Lu	0 - 0.5	7439-94-3
Li	1 - 1.5	7439-93-2

RN 127673-07-8 HCA
CN Indium lithium titanium phosphate (In0-0.5Li1-1.5Ti1.5-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
In	0 - 0.5	7440-74-6
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2

RN 127689-78-5 HCA
CN Lanthanum lithium titanium phosphate (La0.3Li1.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
La	0.3	7439-91-0

RN 127887-18-7 HCA
CN Lithium scandium titanium phosphate (Li1.3Sc0.3Ti1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

CC 76-1 (Electric Phenomena)
ST ionic cond lithium titanium phosphate system; cond lithium titanium phosphate solid **electrolyte**
IT Crystal structure
(of lithium titanium phosphate-based solid **electrolytes**
)
IT Electric conductivity and conduction
(ionic, of lithium titanium phosphate-based solid **electrolytes**)
IT 30622-39-0 **120479-61-0**, Aluminum lithium titanium phosphate (Al0.3Li1.3Ti1.7(PO4)3) **120479-62-1**, Lanthanum lithium titanium phosphate (La0-0.5Li1-1.5Ti1.5-2(PO4)3) **120479-63-2**, Lithium titanium yttrium phosphate (Li1-1.5Ti1.5-2Y0-0.5(PO4)3) **120479-64-3**, Lithium scandium titanium phosphate (Li1-1.5Sc0-0.5Ti1.5-2(PO4)3) **120479-65-4**, Aluminum lithium titanium phosphate (Al0-0.5Li1-1.5Ti1.5-2(PO4)3) **127660-06-4**, Iron lithium titanium phosphate (Fe0-0.5Li1-1.5Ti1.5-2(PO4)3) **127660-07-5**, Gallium lithium titanium phosphate (Ga0-0.5Li1-1.5Ti1.5-2(PO4)3) **127660-08-6**, Chromium lithium titanium phosphate (Cr0-0.7Li1-1.7Ti1.3-2(PO4)3) **127660-09-7**, Lithium titanium phosphate silicate (Li1.4Ti2(PO4)2.6(SiO4)0.4) **127660-10-0**, Lithium titanium phosphate silicate (Li1.3Ti2(PO4)2.7(SiO4)0.3) **127660-11-1**, Lithium titanium phosphate silicate (Li1.2Ti2(PO4)2.8(SiO4)0.2) **127672-84-8**, Lithium titanium phosphate silicate (Li1.5Ti2(PO4)2.5(SiO4)0.5) **127673-06-7**, Lithium lutetium titanium phosphate (Li1-1.5Lu0-0.5Ti1.5-2(PO4)3) **127673-07-8**, Indium lithium titanium phosphate (In0-0.5Li1-1.5Ti1.5-2(PO4)3) **127689-78-5**, Lanthanum lithium titanium phosphate (La0.3Li1.3Ti1.7(PO)4)3) **127887-18-7**, Lithium scandium titanium phosphate (Li1.3Sc0.3Ti1.7(PO4)3)
(ionic cond. and porosity and structure of)
IT 12057-24-8, Lithium oxide, properties 13843-41-9, Lithium pyrophosphate (Li4P2O7)
(ionic cond. and porosity of solid **electrolytes** contg. lithium titanium phosphate and)

L24 ANSWER 10 OF 10 HCA COPYRIGHT 2002 ACS
112:129692 Lithium ion conductive solid **electrolyte**. Adachi, Ginya; Aono, Hiromichi (Fac. Eng., Osaka Univ., Suita, 565, Japan). Kagaku (Kyoto, Japan), 44(11), 766-7 (Japanese) 1989. CODEN: KAKYAU. ISSN: 0451-1964.
AB Recent progress of lithium ion conductive solid **electrolytes** is reviewed with 11 refs., mainly on the lithium titanium phosphate of Li1+xMxTi2-x(PO4)3 which has an ionic cond. as high as 10-4 S/cm at room temp. Partial substitution of Ti4+ by M, e.g., by Al3+, Y3+, or La3+ enhances the ionic cond., e.g., up to 10-3 S/cm for the Li1+xAlxTi2-x(PO4)3 system. This enhancement might be attributed to the dense formation of the solid **electrolyte** **sinter**.
IT **125810-42-6**, Lanthanum lithium titanium phosphate

((La,Ti)2Li1-3(PO4)3) **125810-43-7**, Lithium titanium yttrium phosphate (Li1-3(Ti,Y)2(PO4)3) **125810-44-8**, Aluminum lithium titanium phosphate (Al0-2Li1-3Ti0-2(PO4)3) (ion-conductive solid **electrolyte**)

RN 125810-42-6 HCA
CN Lanthanum lithium titanium phosphate ((La,Ti)2Li1-3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	0 - 2	7440-32-6
Li	1 - 3	7439-93-2
La	0 - 2	7439-91-0

RN 125810-43-7 HCA
CN Lithium titanium yttrium phosphate (Li1-3(Ti,Y)2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Y	0 - 2	7440-65-5
Ti	0 - 2	7440-32-6
Li	1 - 3	7439-93-2

RN 125810-44-8 HCA
CN Aluminum lithium titanium phosphate (Al0-2Li1-3Ti0-2(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	0 - 2	7440-32-6
Li	1 - 3	7439-93-2
Al	0 - 2	7429-90-5

CC 76-0 (Electric Phenomena)
ST review lithium ion conductive solid **electrolyte**
IT **Electrolytes**
(solid, lithium-ion-conductive)
IT **125810-42-6**, Lanthanum lithium titanium phosphate ((La,Ti)2Li1-3(PO4)3) **125810-43-7**, Lithium titanium yttrium phosphate (Li1-3(Ti,Y)2(PO4)3) **125810-44-8**, Aluminum lithium titanium phosphate (Al0-2Li1-3Ti0-2(PO4)3) (ion-conductive solid **electrolyte**)

=> d l20 1-5 ti

L20 ANSWER 1 OF 5 HCA COPYRIGHT 2002 ACS
TI Ionic conductivity of Li3-2x(Sc1-xZrx)2(PO4)3 thin film prepared by sputtering method

L20 ANSWER 2 OF 5 HCA COPYRIGHT 2002 ACS
TI Lithium insertion in vanadyl phosphate

L20 ANSWER 3 OF 5 HCA COPYRIGHT 2002 ACS
TI A novel fast lithium-ionic conductor

L20 ANSWER 4 OF 5 HCA COPYRIGHT 2002 ACS
TI Alpha-decay-induced condensation of phosphate anions in a mineral

L20 ANSWER 5 OF 5 HCA COPYRIGHT 2002 ACS
TI Detection of lithium by thin plastic foils